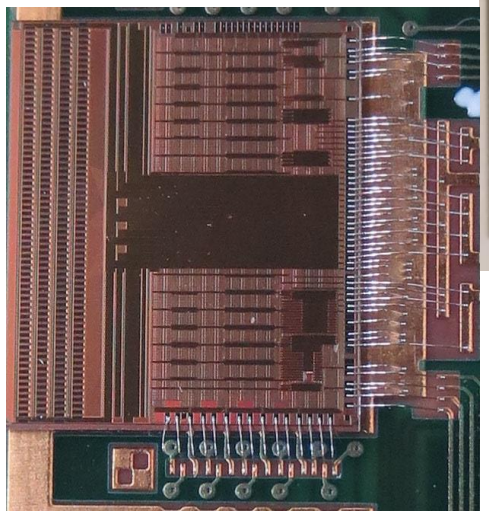
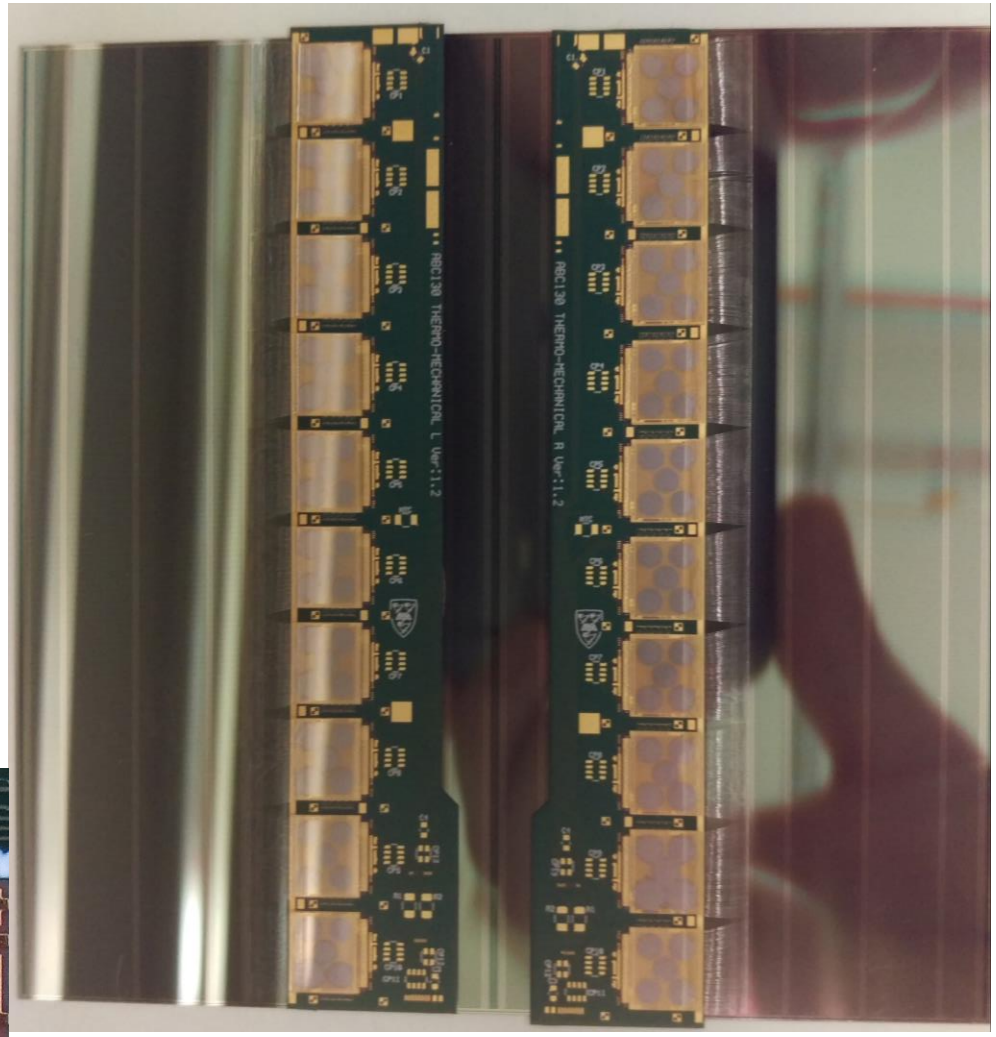
Strip module test setup progress

Strip Module

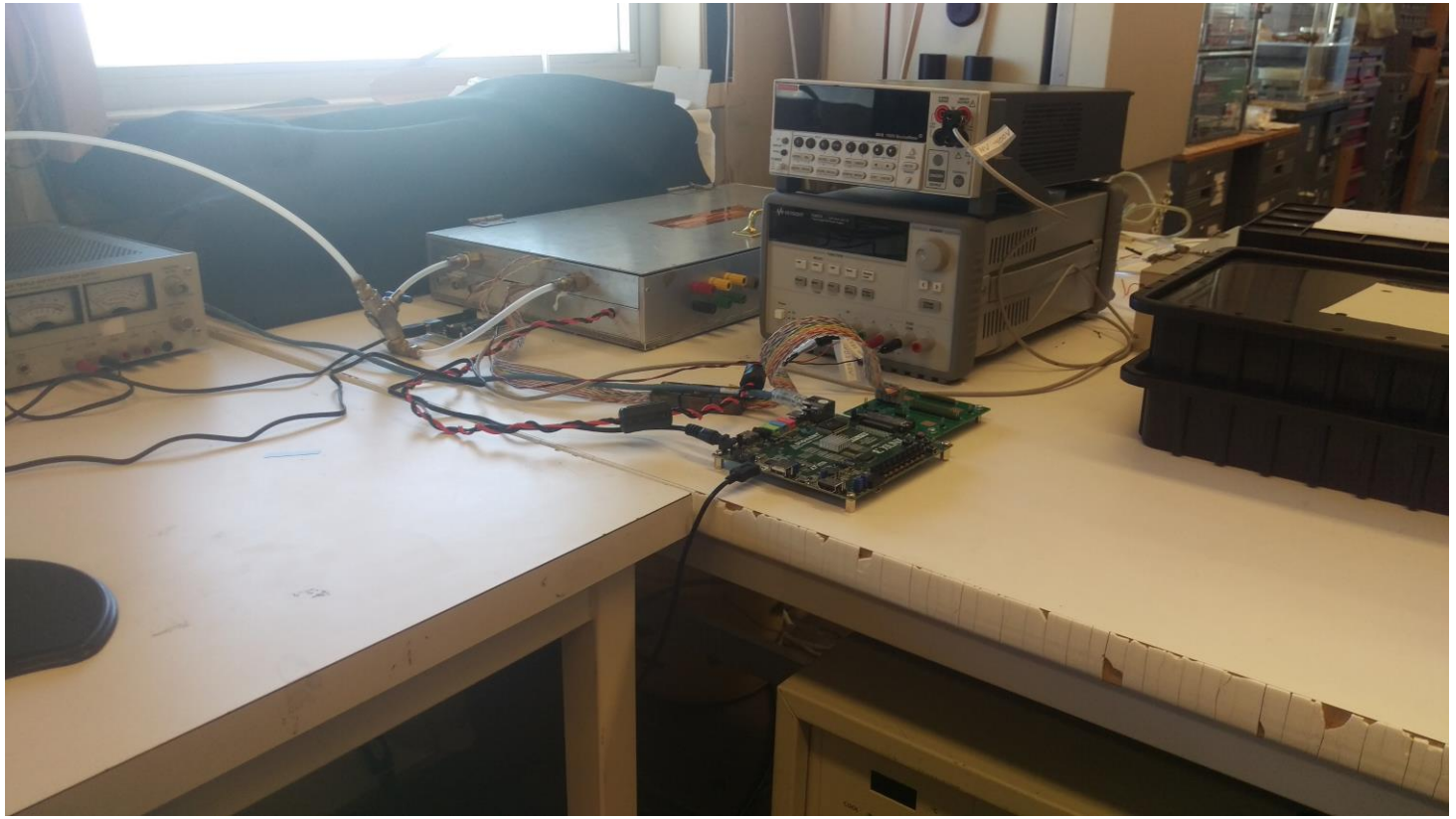
- Silicon strip sensor plate
- 2 hybrids glued on top
- 10 ABC130 chips per hybrid each can read 256 channels
- One Hybrid Control Chip (HCC) that reads the 10 ABC chips
- Module will also feature power converter (not shown)





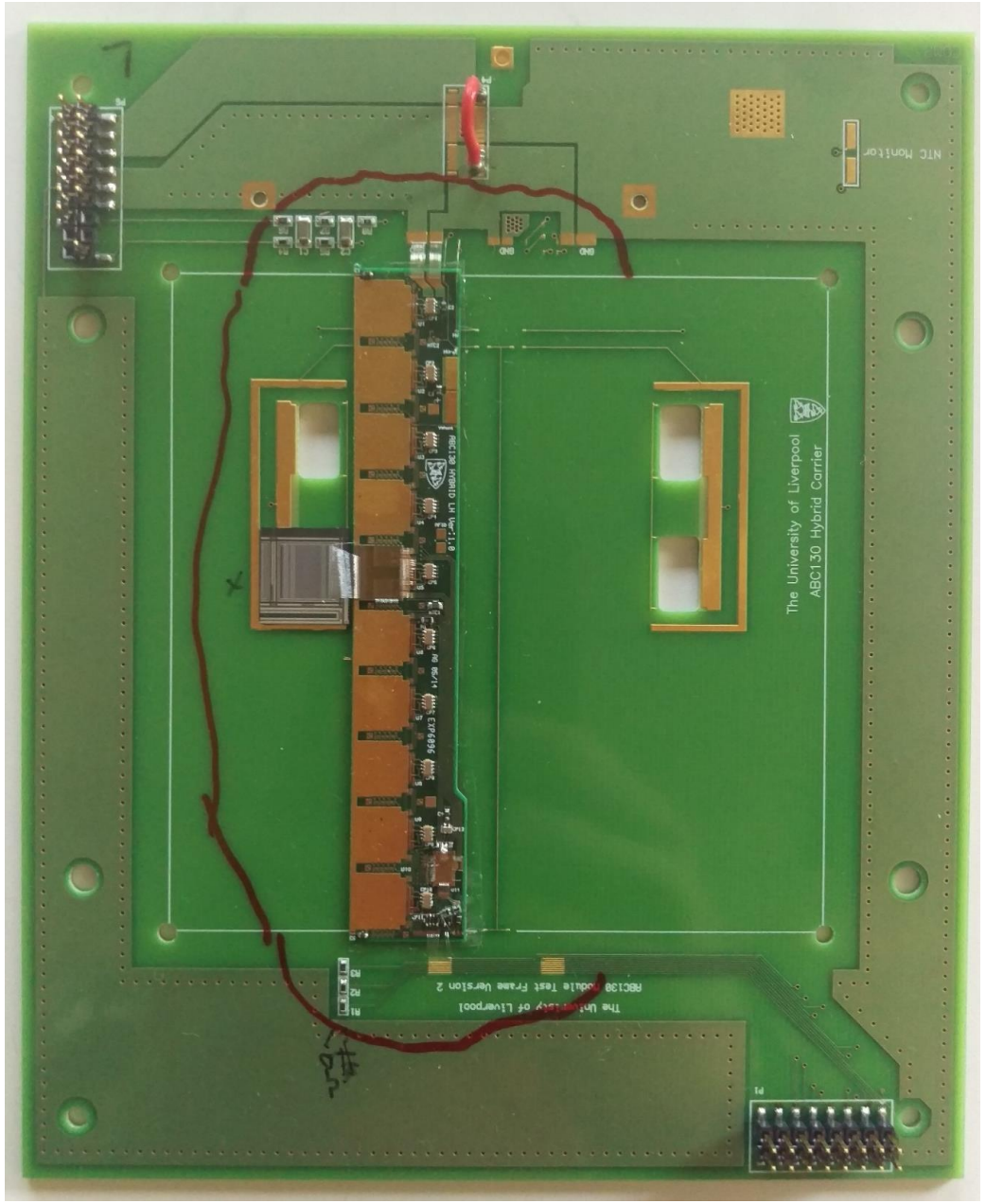
DAQ setup

- Data communication with Module through Atlys board FPGA
- Power supply for DAQ
- Power supply for module
- High Voltage supply for sensor biasing
- Dry Air connection
- Cooler to cool module (visible under table)



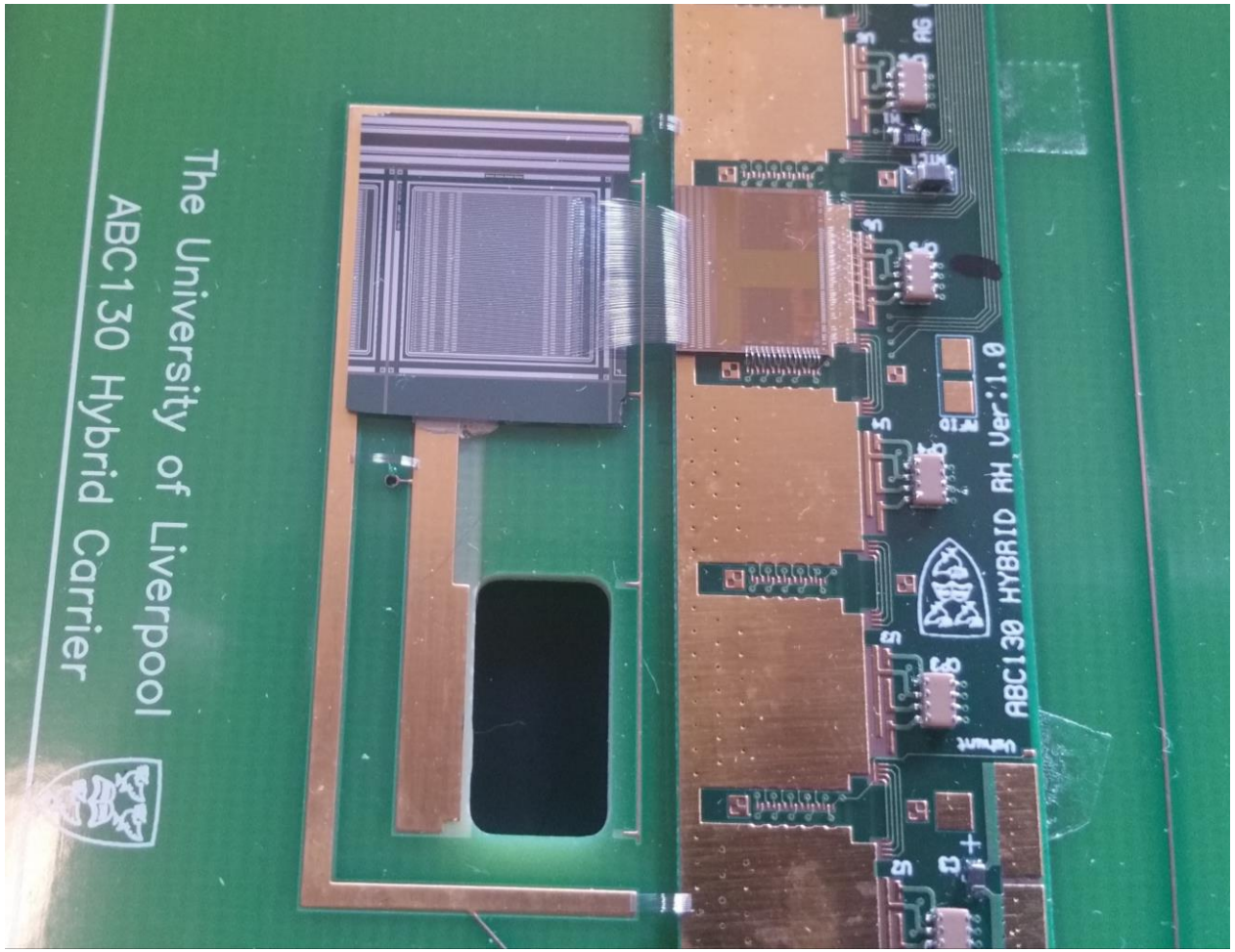
DAQload

- Features one ABC130 chip and HCC chip
- Mini-sensor connected to ABC130 chip



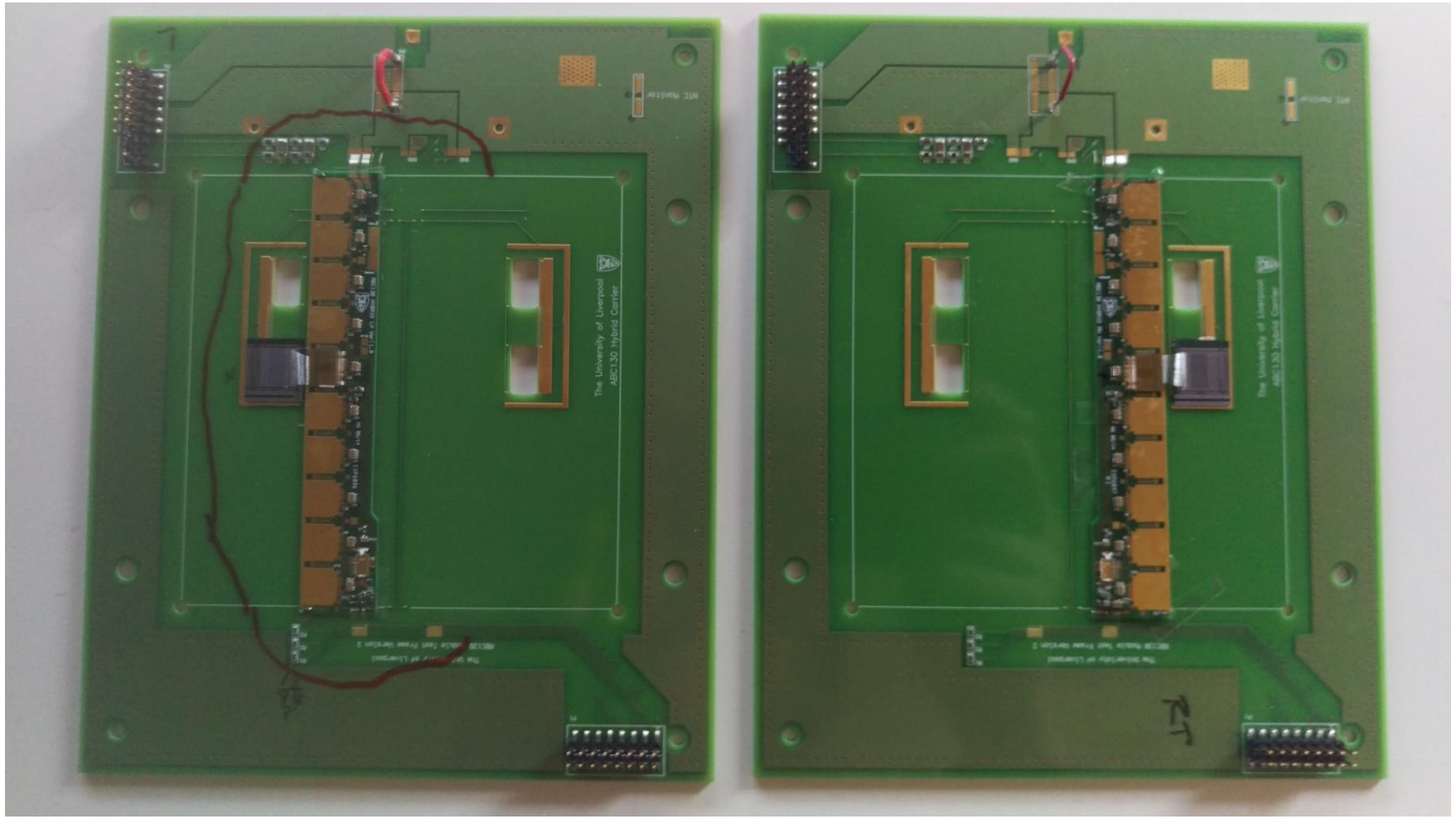
Bonding Pattern

- Mini-sensor not size of full sensor
- Only 100 channels connected from chip to sensor (out of 256 possible channels)



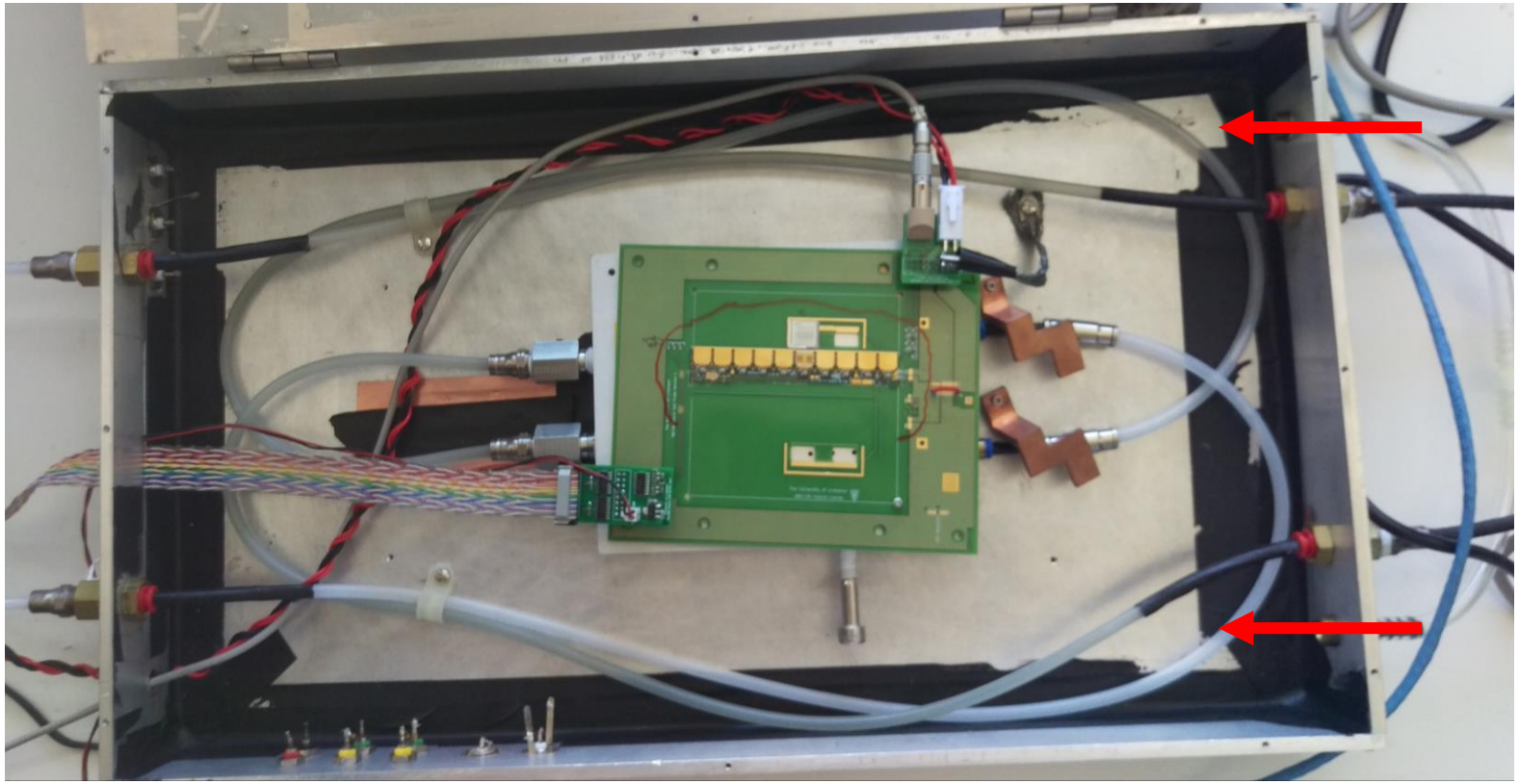
Left Handed vs. Right Handed

- Two DAQloads to test both left and right handed hybrids
- Wire bonding is not exactly symmetric



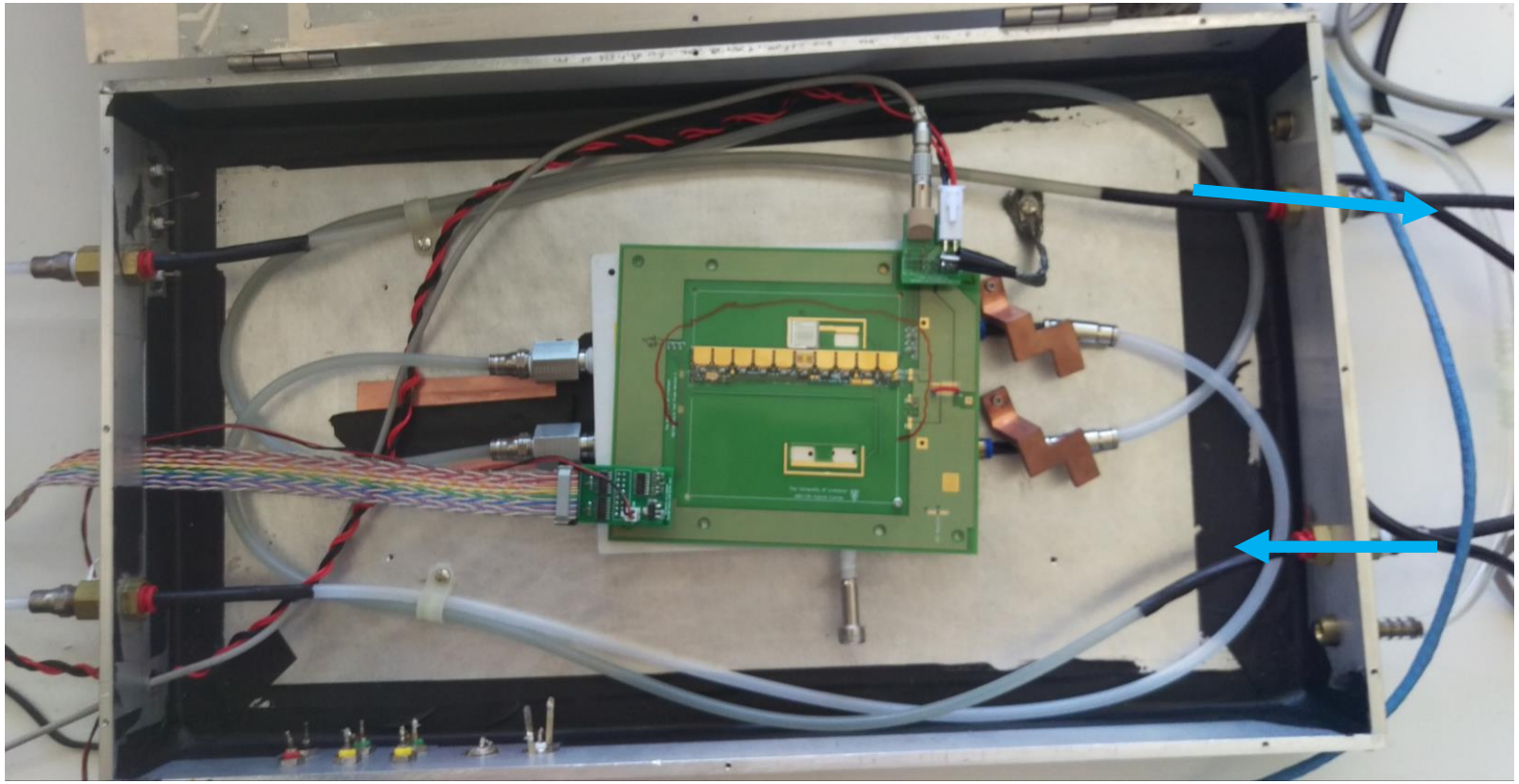
Testing Chamber

- Dry air connection



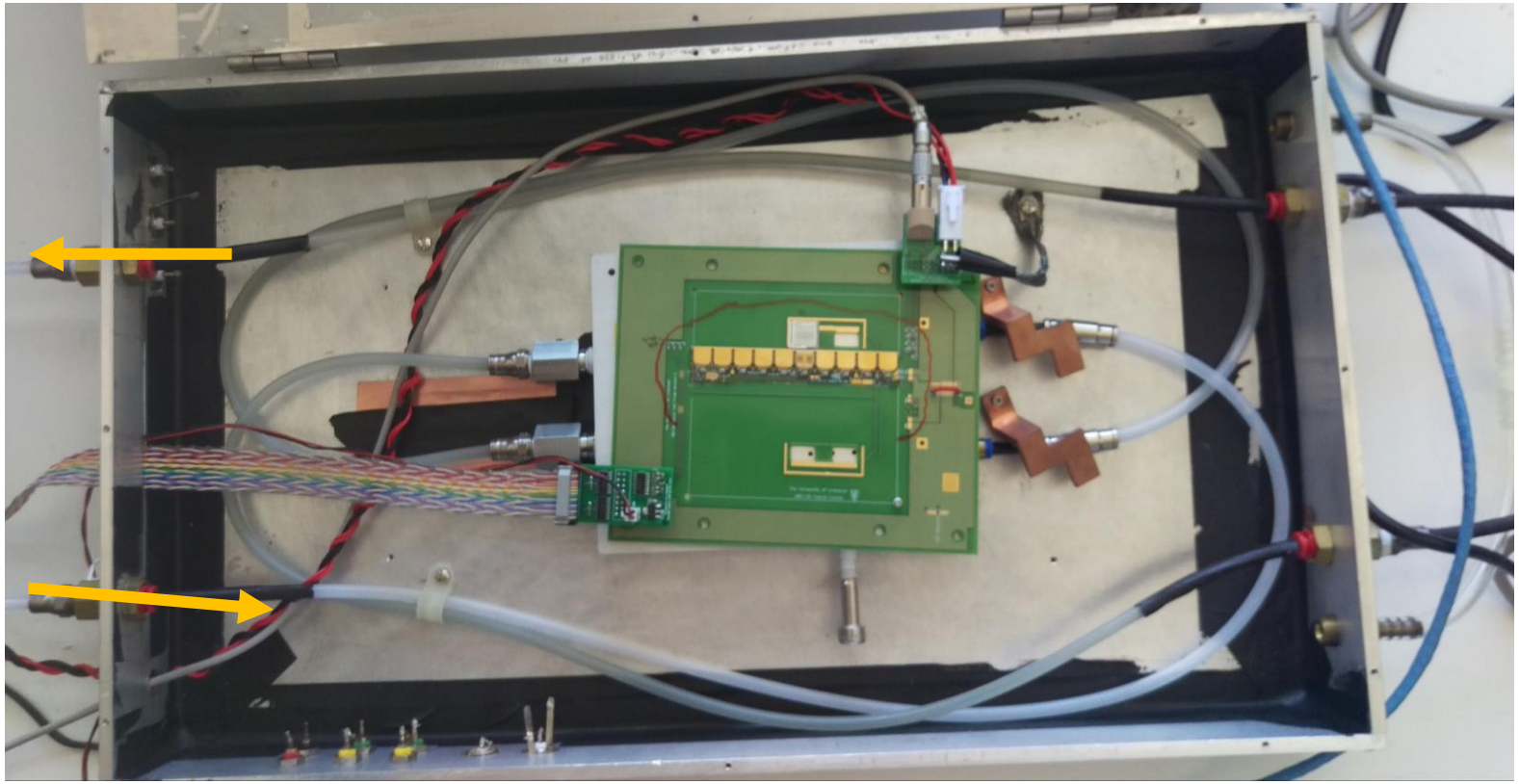
Testing Chamber

- Dry air connection
- Cooling to testing jig



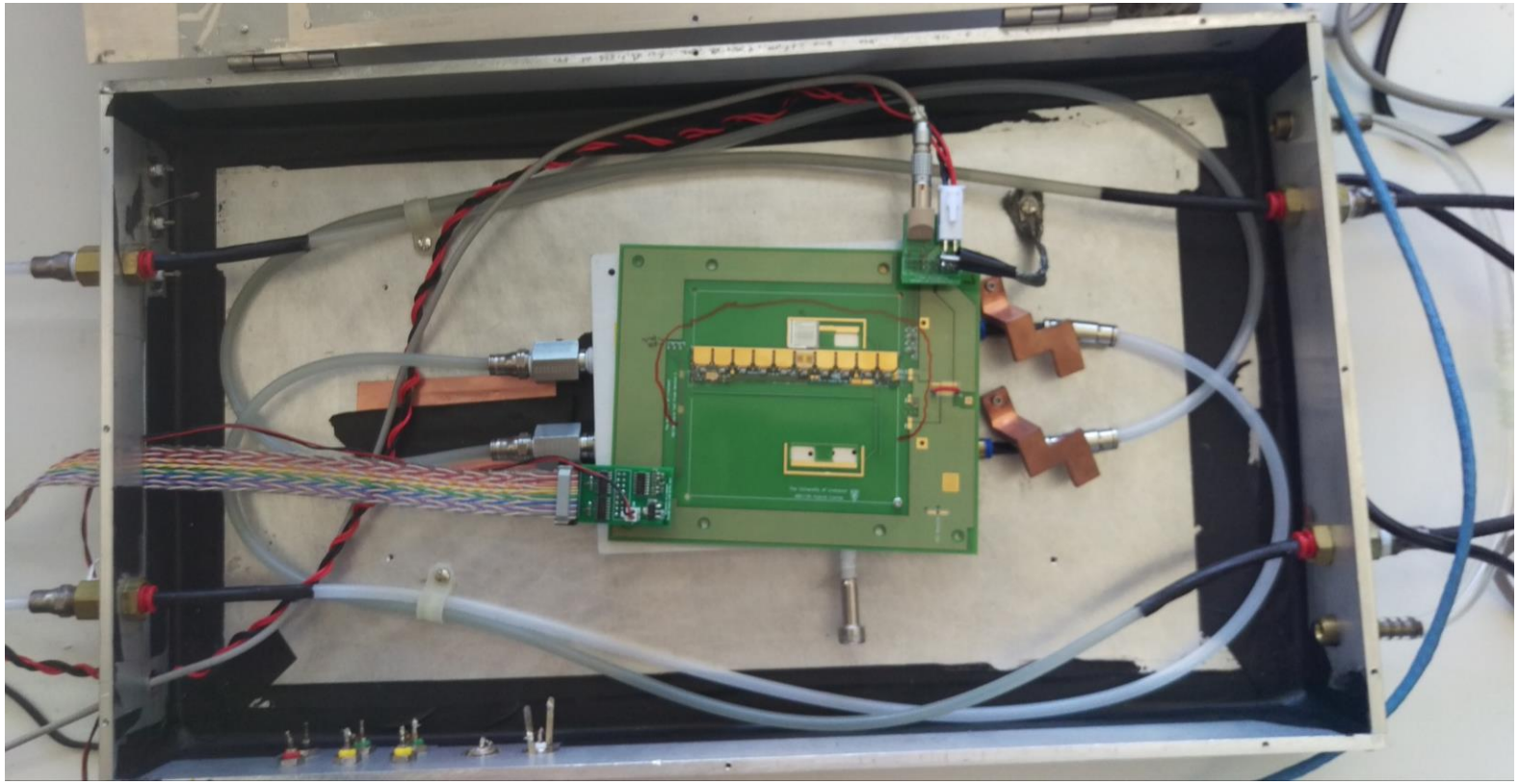
Testing Chamber

- Dry air connection
- Cooling to testing jig
- Room for vacuum connection (not yet implemented).



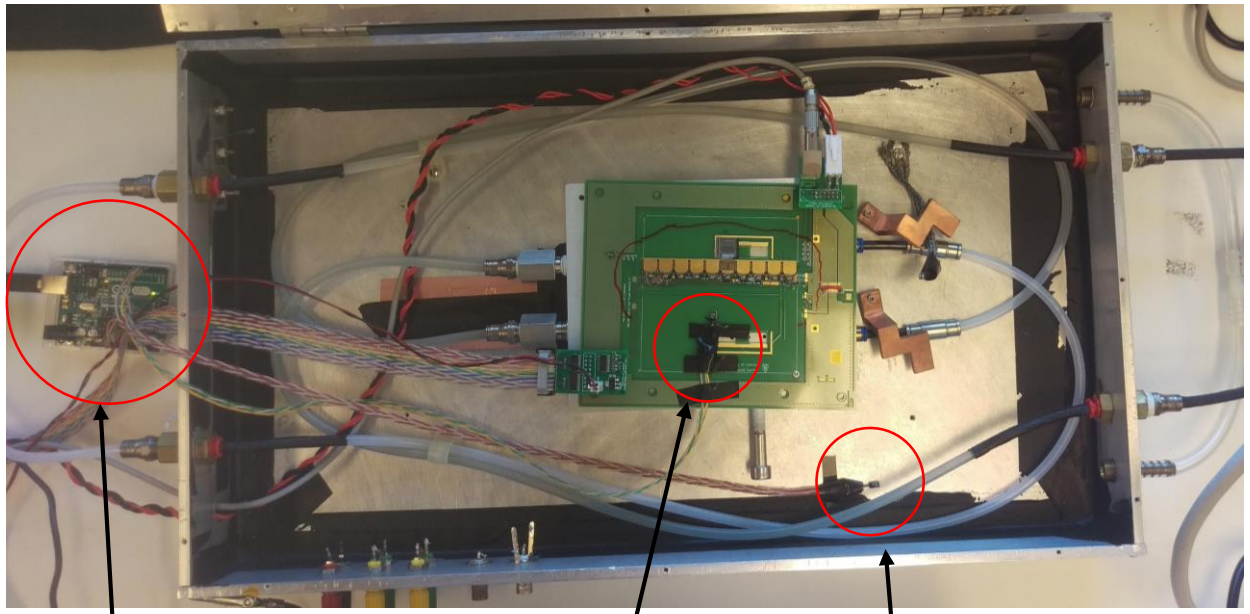
Testing Chamber

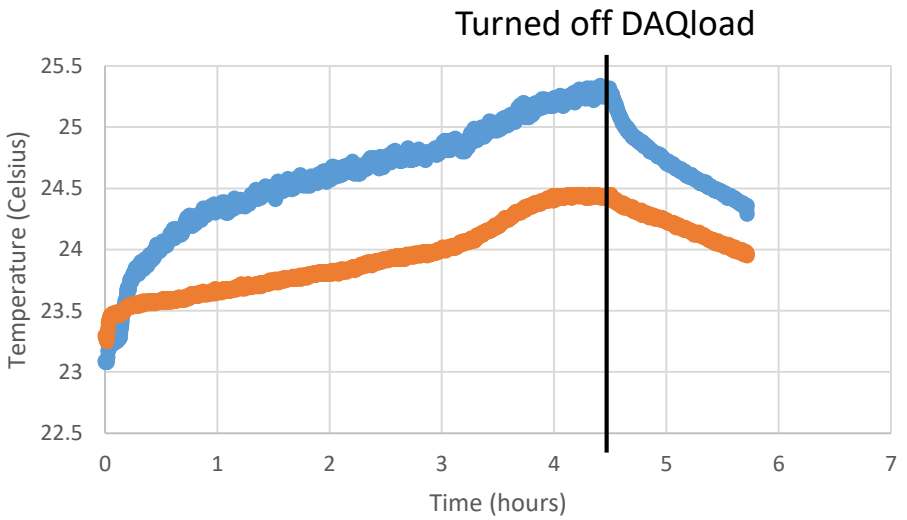
- Dry air connection
- Cooling to testing jig
- Room for vacuum connection (not yet implemented).
- Arduino circuit with 2 sensors tracking temperature and dewpoint (not shown)

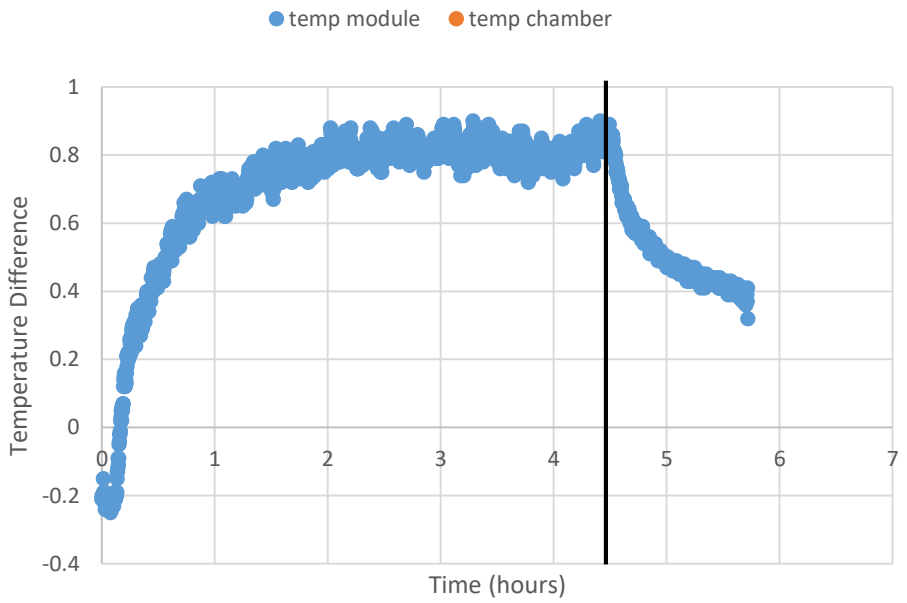


Temperature Data

- Heating seen with only one chip on the order of 1° C

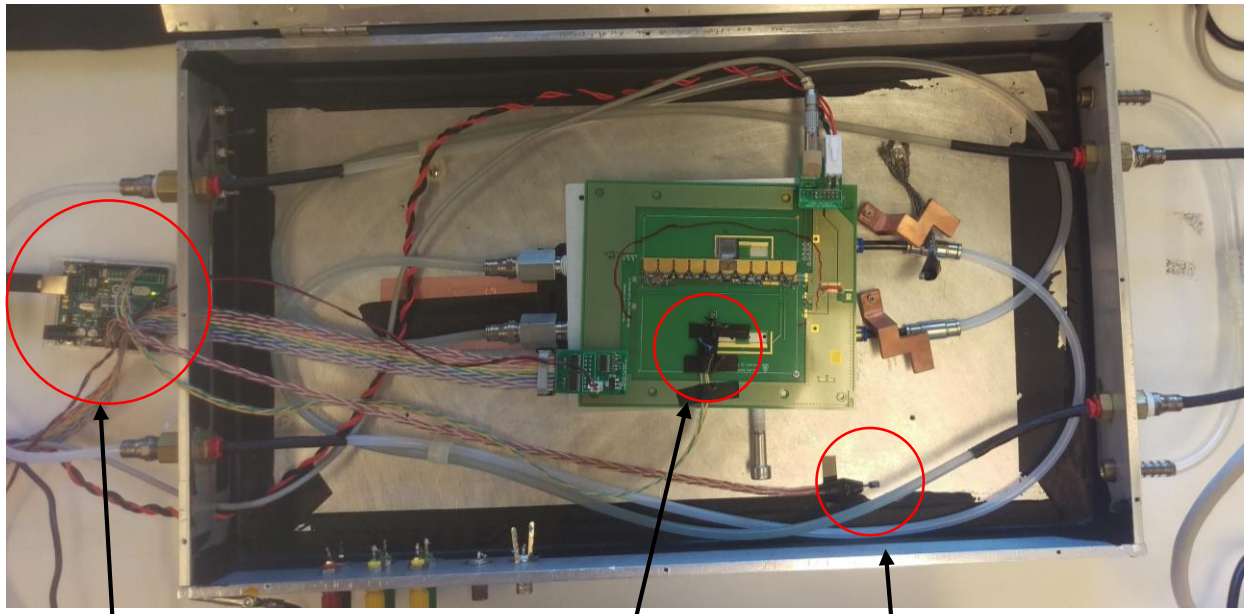


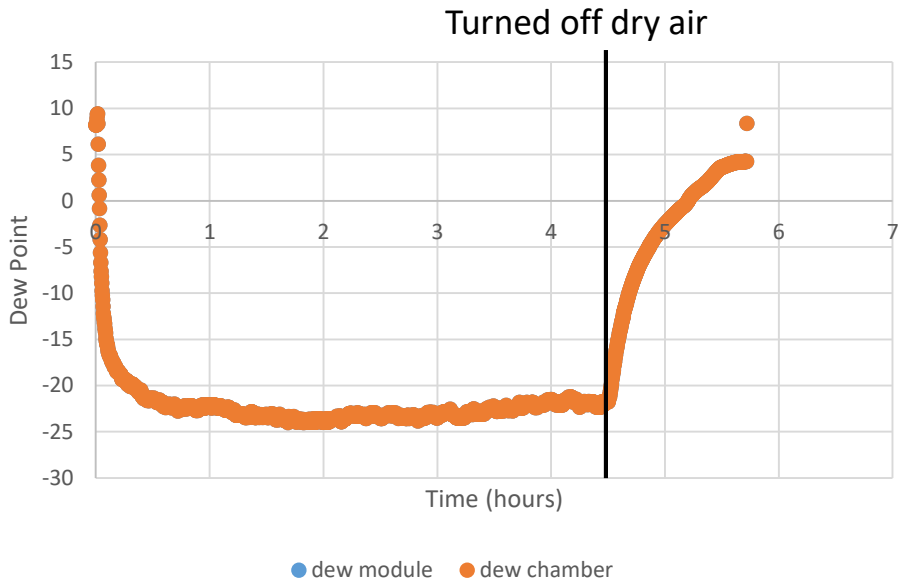




Humidity Data

- Humidity quickly falls then stays stable with dry air connection



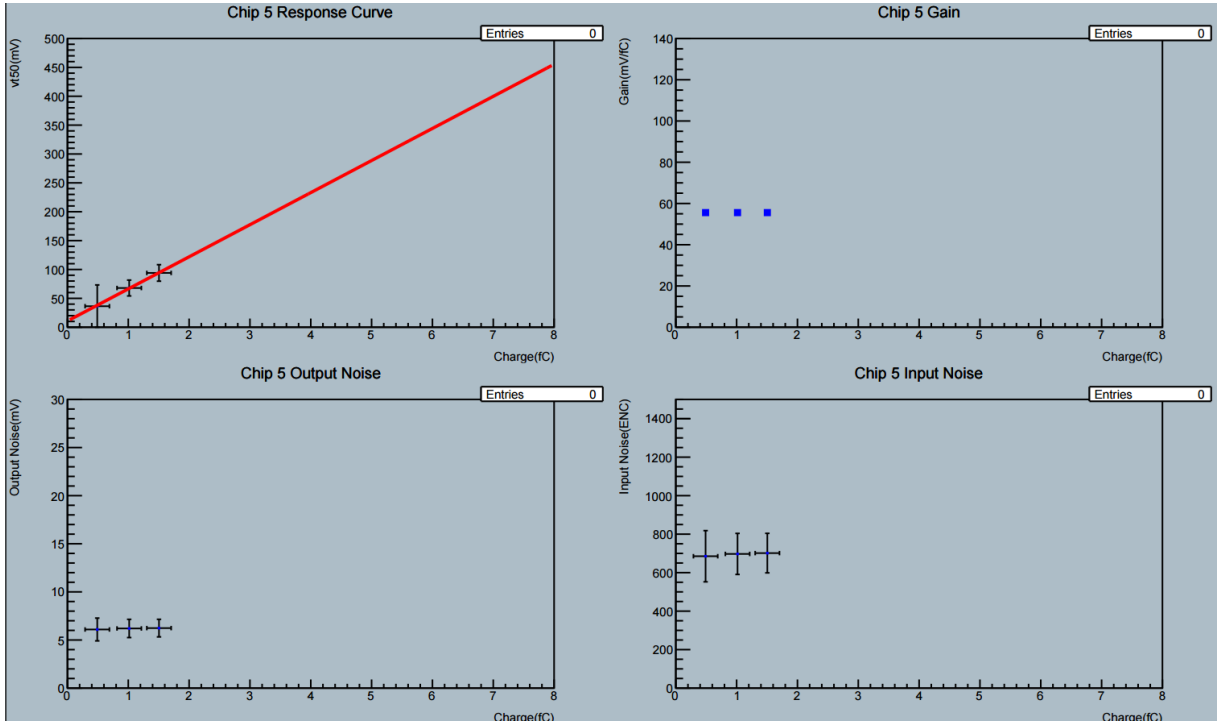


Electrical Tests

- DAQloads connected and functional
  - Left handed DAQloads pulls 600nA of current while Right handed only pulls 50nA.
- Test effects of HV biasing and cooling on electronics
- Run 3 point gain tests, Threshold scan at 3 different injected charges
  - 0.5, 1, 1.5 fC
  - 1.5, 2, 2.5 fC
  - Or full response curve: 0-6 fC

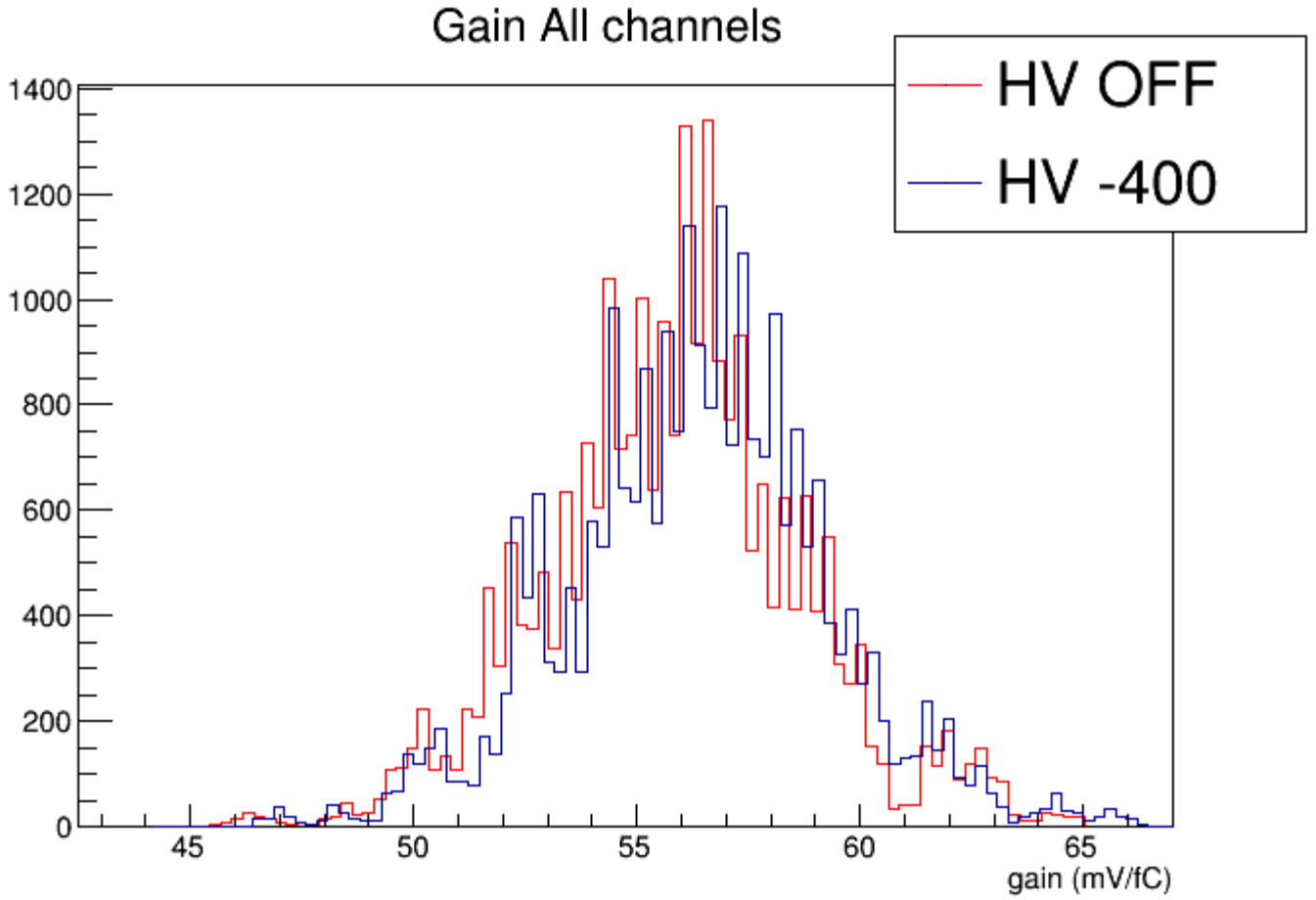
3 Point Gain Test

- Run threshold scan at given charge injection. Take point where 50% of signals are over threshold (called vt(50))
- Taking vt(50) points from threshold scan can calculate electrical values for chip
  - Gain is slope of fit line
  - Offset of fit
  - Output noise from chip



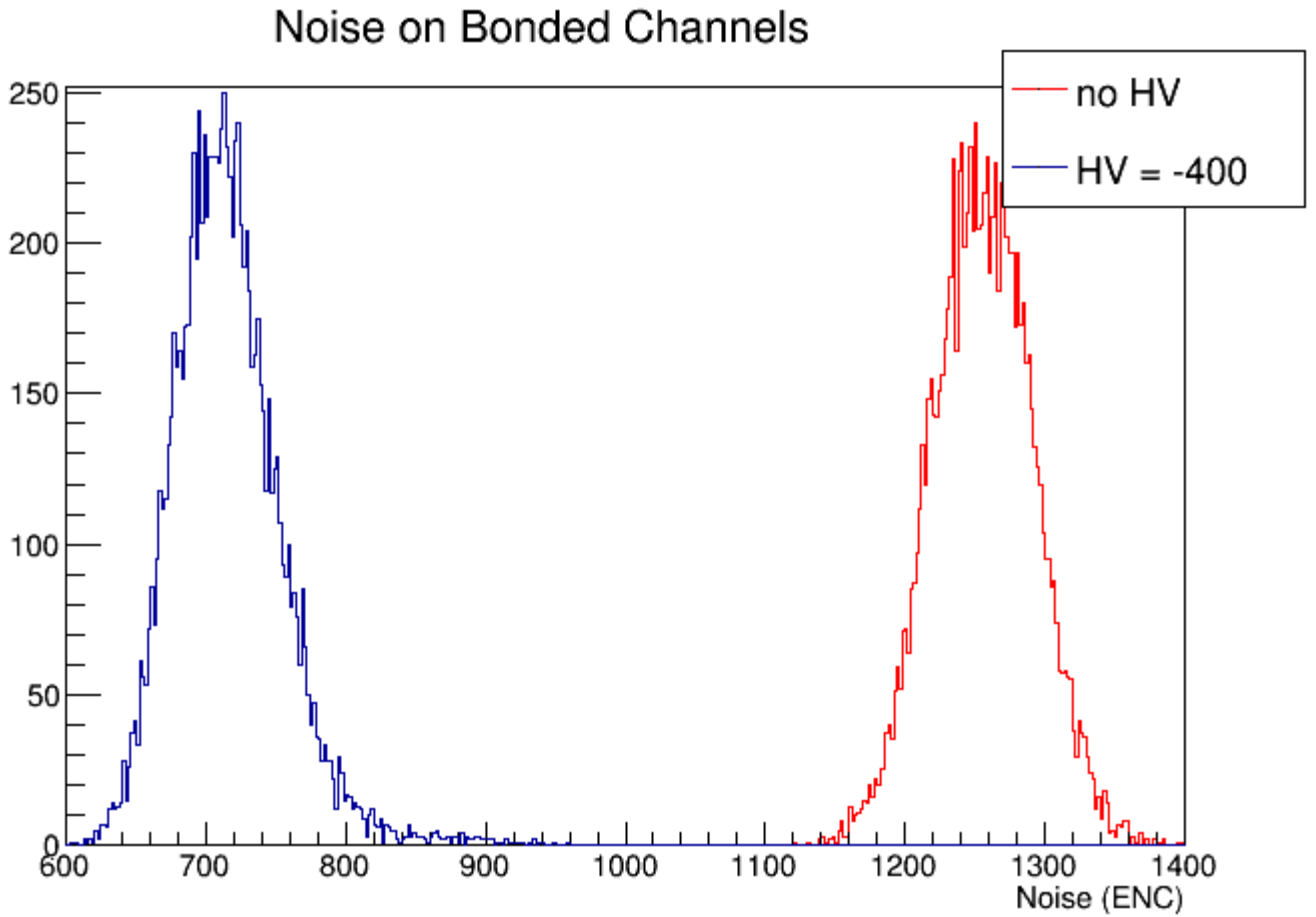
Long Run (LH DAQload)

- Run 100 three point gain tests with no high voltage and with high voltage.
- Each set of 3PG tests took ~90 minutes to run



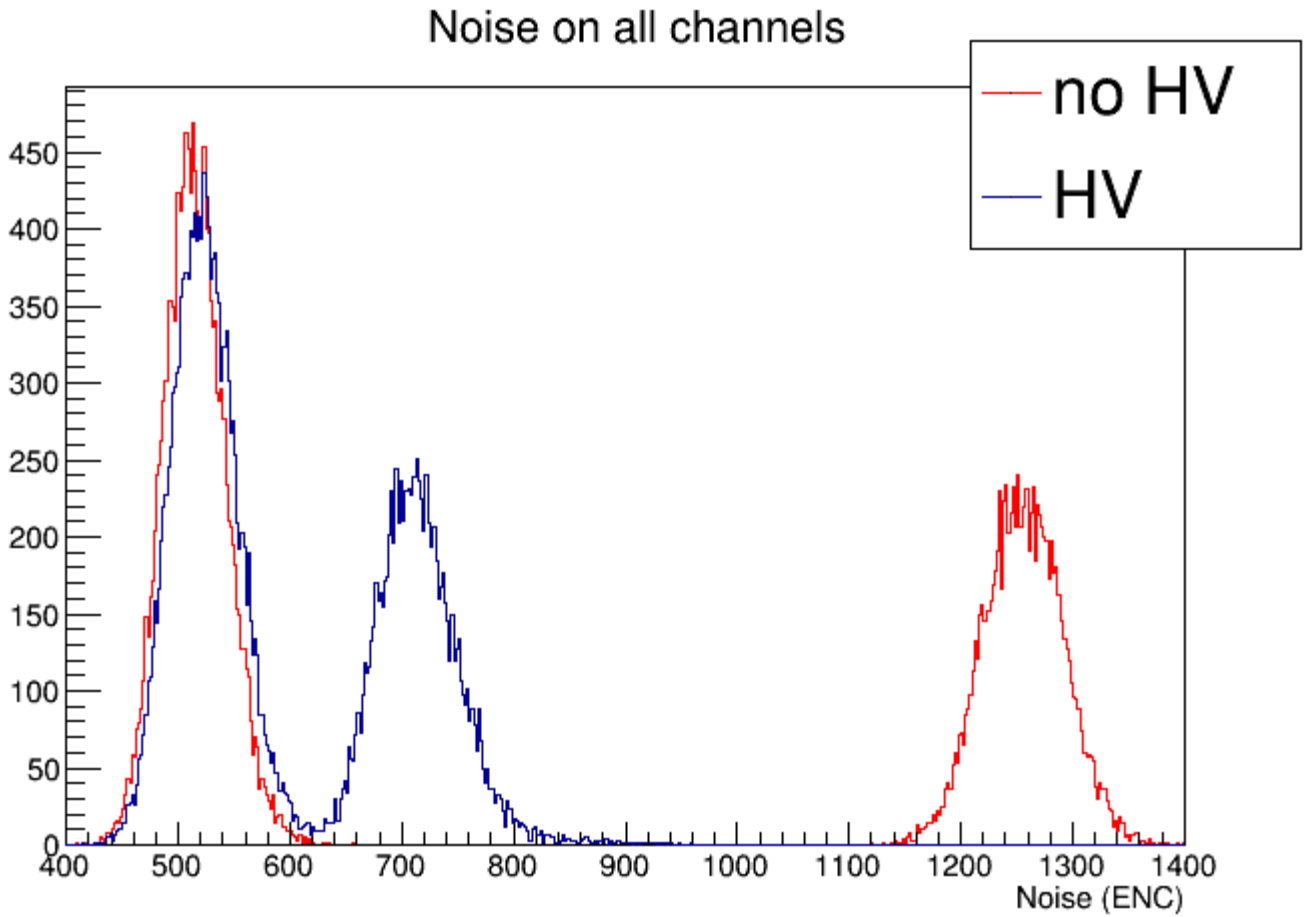
Noise

- Noise on 100 channels bonded to the mini-sensor
- Clear decrease in noise when HV biasing is applied to the chip
  - Evidence that the sensor is correctly connected



Noise

- Noise on all 256 channels
- Clear decrease in noise when HV biasing is applied to the chip
  - Evidence that the sensor is correctly connected
- Including the unbonded channels shows agreement with HV on and off (sanity check)



Next Steps

- Combine DAQ data with Arduino temperature data.
- Connect power supplies to computer to track current and voltage on sensor and module.
- Investigate differences between left handed and right handed DAQloads